Can a Scientist Believe in Miracles?

A BAYESIAN APPROACH

Tamsin Nicholson

Given that many scientists around the world subscribe to various faiths, we can ascertain that many scientists do in fact believe in miracles. However, holding such beliefs may be seen as antithetical to a scientific approach. So instead we ask, how can a scientist believe in miracles without compromising their scientific principles?

The solution to this lies in Bayesian thinking and the approach by the Lourdes Medical Bureau (LMB). According to the Oxford English Dictionary, a miracle must be inexplicable "by natural or scientific laws and is therefore attributed to a divine agency". The LMB assess the healing events at Lourdes to ascertain if they are explicable by current scientific knowledge. If they deem it to be inexplicable, the case is then passed on to the Church to decide if they believe it is attributable to divine agency. But this lends itself to a Bayesian approach: the LMB ultimately ask 'given observable evidence, is this healing inexplicable by current scientific knowledge?' whilst the Church board ask 'given that this healing is inexplicable, is it attributable to divine agency?'.

To make their assessment, the LMB have several pre-requisites prior to consideration: Patients must be diagnosed with an incurable condition at LMB upon arrival in Lourdes, following a claim of rapid cure related to Lourdes visit, patients are reassessed for symptoms and monitored for relapse for 5-12 years. If the initial diagnosis is found to be correct, and if there is no indication of relapse, the LMB will investigate the case for any possible explanation of the event by existing scientific knowledge.

Let's take the most recent miracle: Jean Pierre Bély's cure of Multiple Sclerosis (MS), as a case study.

MS is a chronic condition, in which the immune system attacks cells of the central nervous system resulting in areas of damage which cause

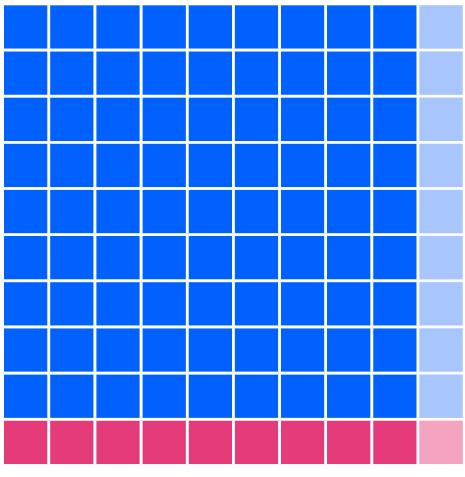
progressive disability, paralysis and death. The body has some capacity for repair, but this does not happen in the majority of lesions.

The LMB wish to know how likely it is that Bély is cured of progressive MS, given his current state of health. During his visit to Lourdes, Bély discovered that he had recovered from his paralysis and was able to walk for the first time in two years. Using a Bayesian approach, we can proportionally estimate which outcome is most likely. In Bayesian thinking, rather than Bayesian statistics, rough proportional estimates can be used to great effect. In Bayesian thinking, it is the resulting belief, rather than the actual ratios that are of value.

We know that Bély can walk and has remission of symptoms, but we want to know if he was cured of MS or another disease. If Bély was cured of another disease, it may be explicable by current medical knowledge and therefore would not be a miracle. But first we must generate our Likelihood values: Given our existing knowledge of MS and it's remission, we can estimate that 90-100% of MS cures would result in the patient being able to walk. Furthermore, we can estimate that of other diseases with similar symptoms to MS, cure would also result in the patient being able to walk in 90-100% of cases.

But of importance in this case, is how likely misdiagnosis would be. Considering that Bély had been diagnosed by several medical professionals, we may estimate that misdiagnosis would be unlikely with approximately a 1:9 ratio of misdiagnosis to correct diagnosis. This value is known as the Prior.

We can visualise these estimates using the diagram [left]. The estimate of correct diagnosis is represented by the **blue** squares and the **pink** squares represent misdiagnosis. The darker squares represent the likelihood of the cure of symptoms in each case. Whilst the lighter squares represent the



likelihood of a cure not occurring.

As mentioned previously, our estimates may not be accurate, but this is still a useful method to direct our belief. As you can see, the dark blue squares occupy the largest area. The combination (multiplication) of the Likelihood and Prior in this way is known as the Posterior. In this case, the cure of Bély's MS, is rendered the most likely outcome. Given that there are no understood cures of MS, this eventuality falls outside current medical knowledge. At Lourdes, the case would then be passed on to the Church for validation as a miracle.

But for a scientist, our next question is 'given the inexplicable cure of Bély, what is the likelihood that this is caused by divine agency?' This can also be approached using Bayesian thinking, but it will vary greatly between individuals considering whether they believe in a divine power or not. An atheist for example, would have different Priors than a theist or an agnostic. A scientist that believes in God is much more likely to attribute this event to divine agency and therefore, they are able to believe that this event is a miracle.

Bayesian thinking provides a useful means by which a scientist can explore a belief in miracles. The Bayesian approach enables an event to be assessed in terms of how well it meets the definition of a miracle. If the scientist believes in the possibility of divine agency, they can then evaluate the likelihood of it being a miracle, according to their own belief system. Therefore, if a scientist believes in the possibility of divine agency, a scientist can also believe in miracles without compromising their scientific principles.

Bibliography

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